

Space Weather Models running in real-time or forecasting mode

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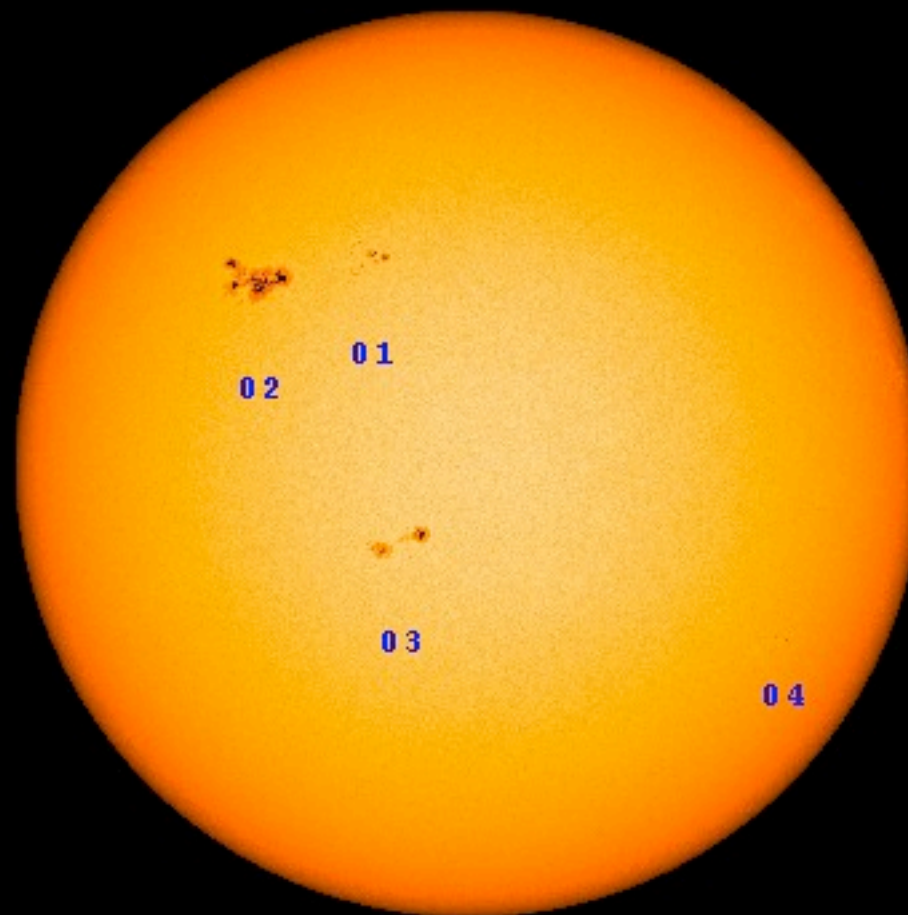
SW REDI 2013

Flare Prediction Model

ASAP (Automatic Solar Activity Prediction)

<http://spaceweather.inf.brad.ac.uk/asap/>

SOLAR FLARE
PROBABILITY = 52%



NO	CLS	M	X
01	DA0	5%	1%
02	EKC	63%	66%
03	DAC	6%	4%
04	CS0	0%	0%

SOLAR FLARE MONITOR

Generated by ASAP
6/ 3/2012 23:45 UTC

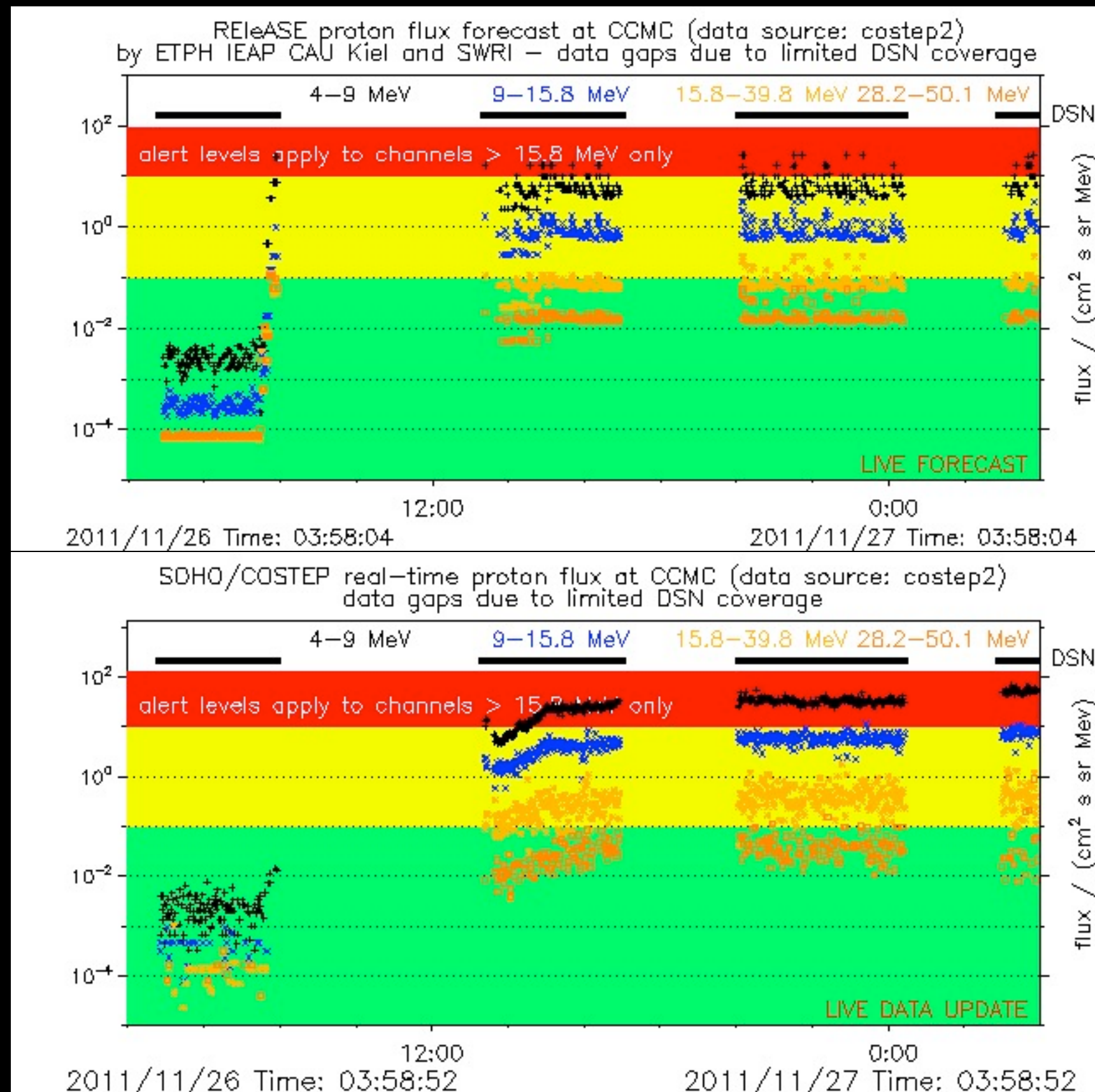
<http://spaceweather.inf.brad.ac.uk/>
UNIVERSITY OF BRADFORD

SEP prediction

REleASE (Relativistic electron Alert System for Exploration)

- Proton flux forecast model based on electron measurements by SOHO/COSTEP
- developed by Arik Posner (NASA/HQ)
- Reference: Posner, A. (2007), Up to 1-hour forecasting of radiation hazards from solar energetic ion events with relativistic electrons, Space Weather, 5, S05001, doi: 10.1029/2006SW000268.

RELeASE: example

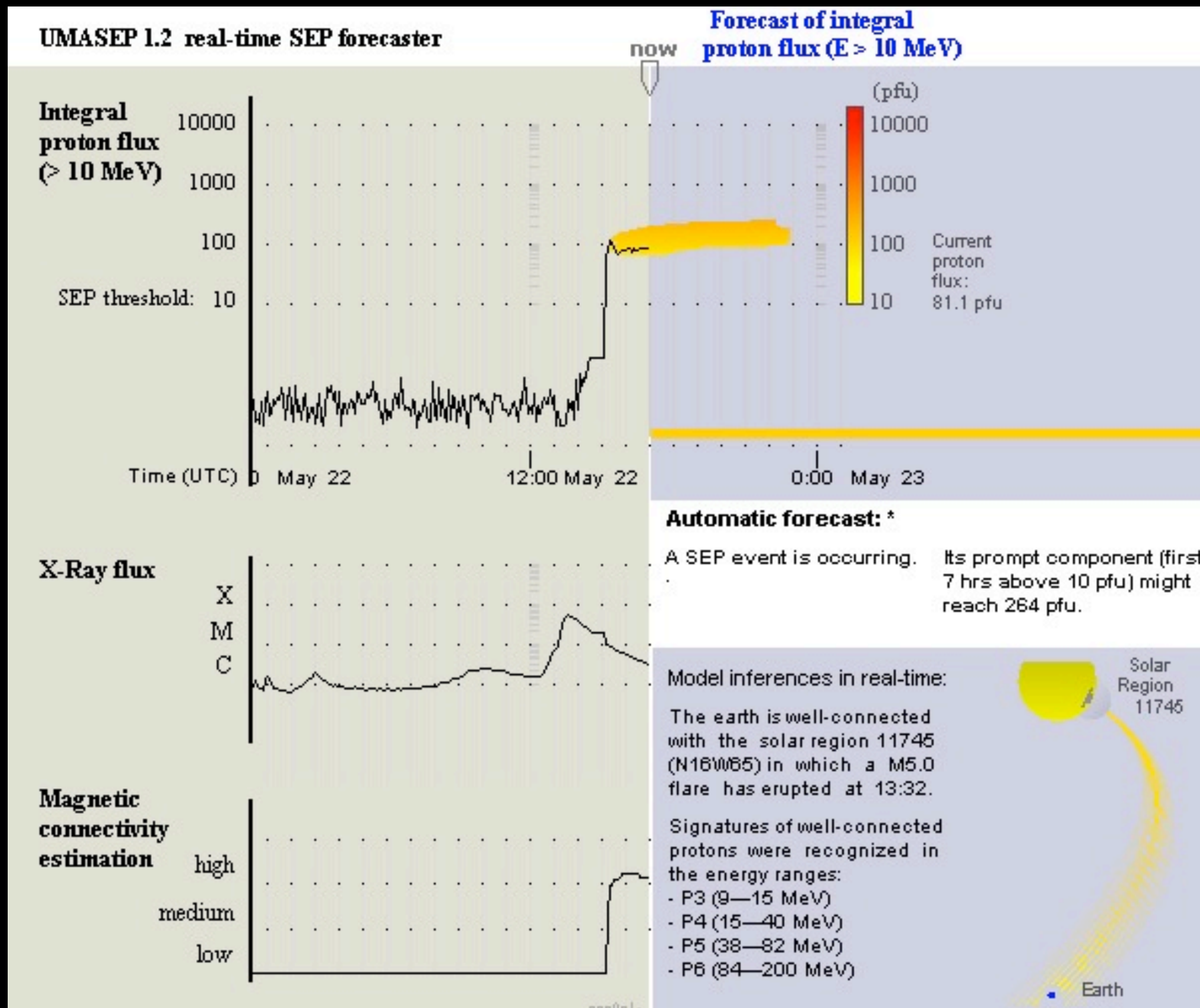


SEP prediction

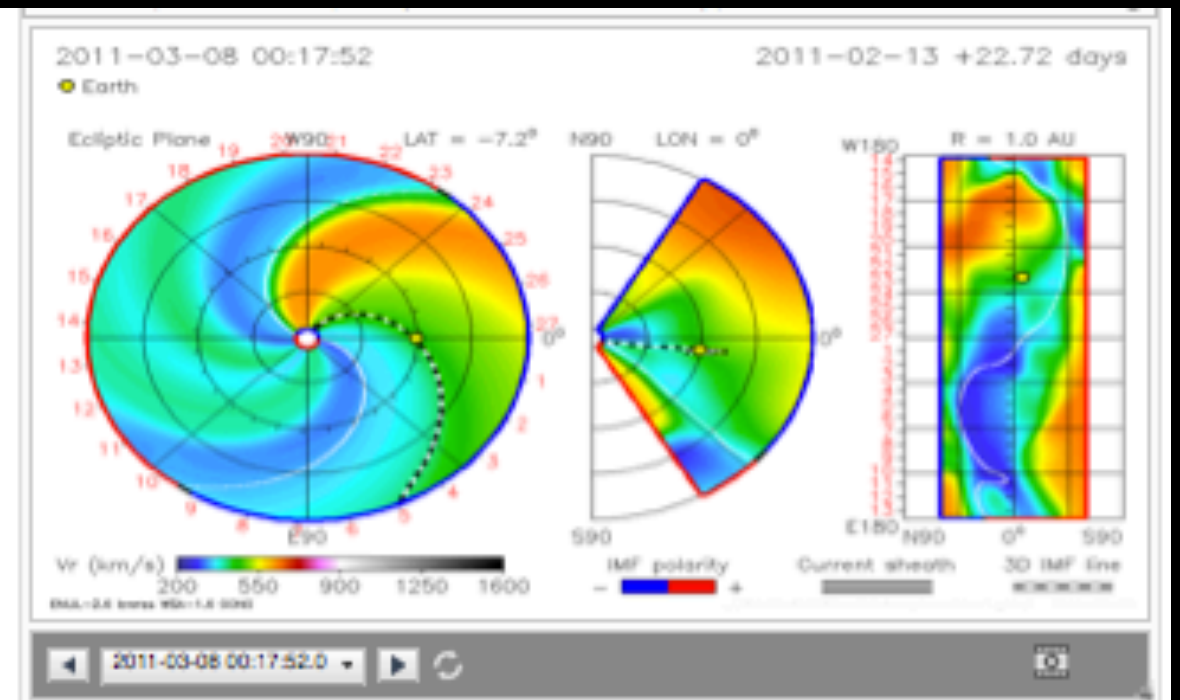
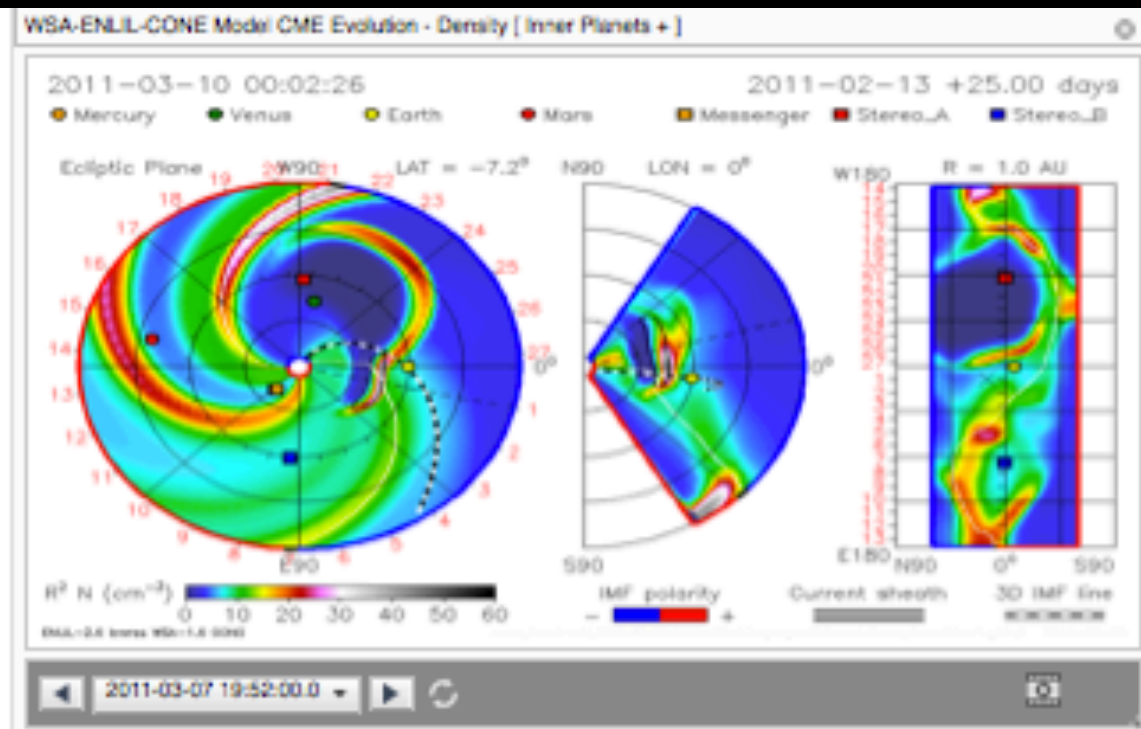
UMA proton flux forecast

- Núñez, M. (2011), Predicting solar energetic proton events ($E > 10$ MeV), Space Weather, 9, S07003, doi 10.1029/2010SW000640.

UMASEP model



WSA+ENLIL

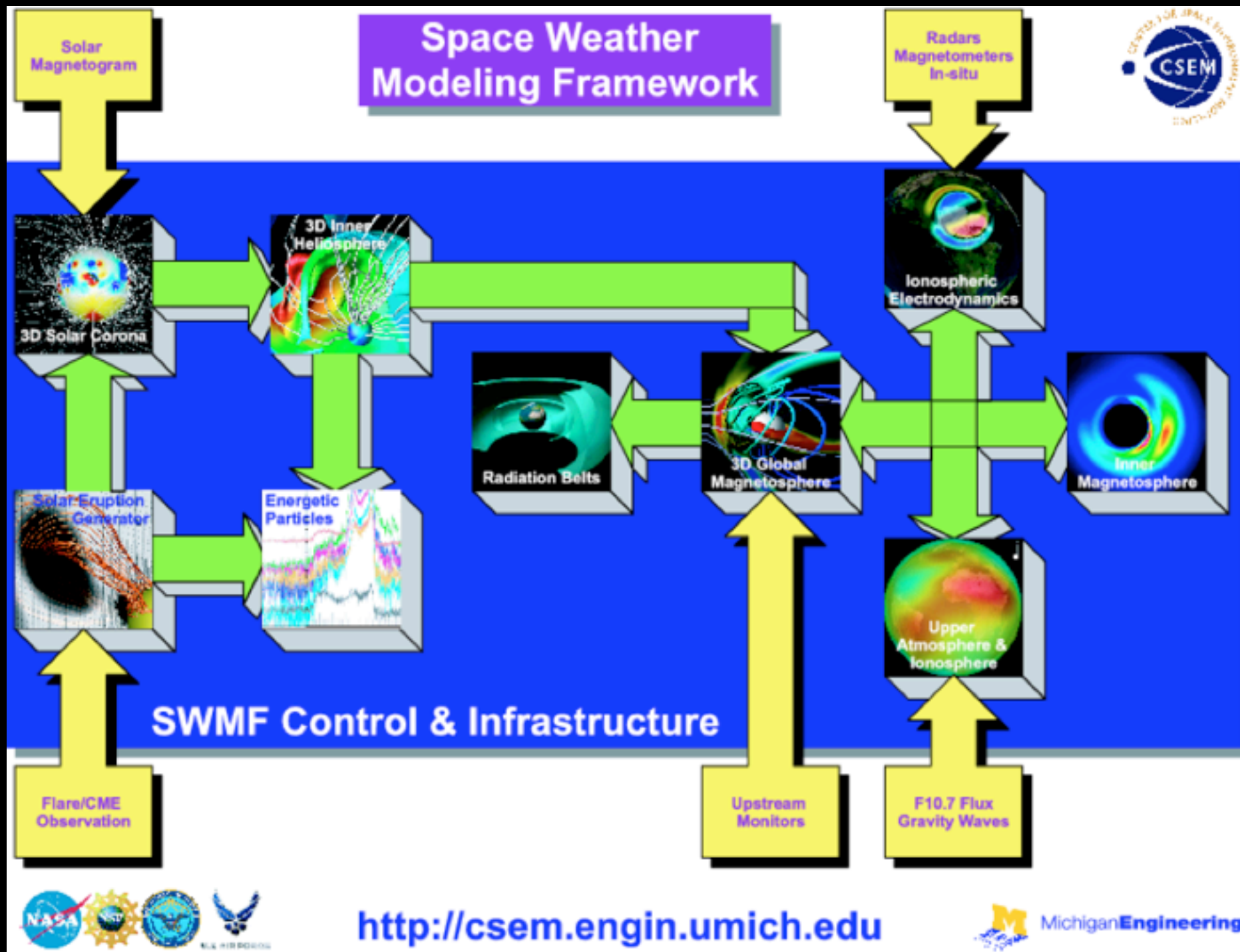


Predicting transport/
impacts of CME

Modeling and
Predicting of the
ambient solar wind

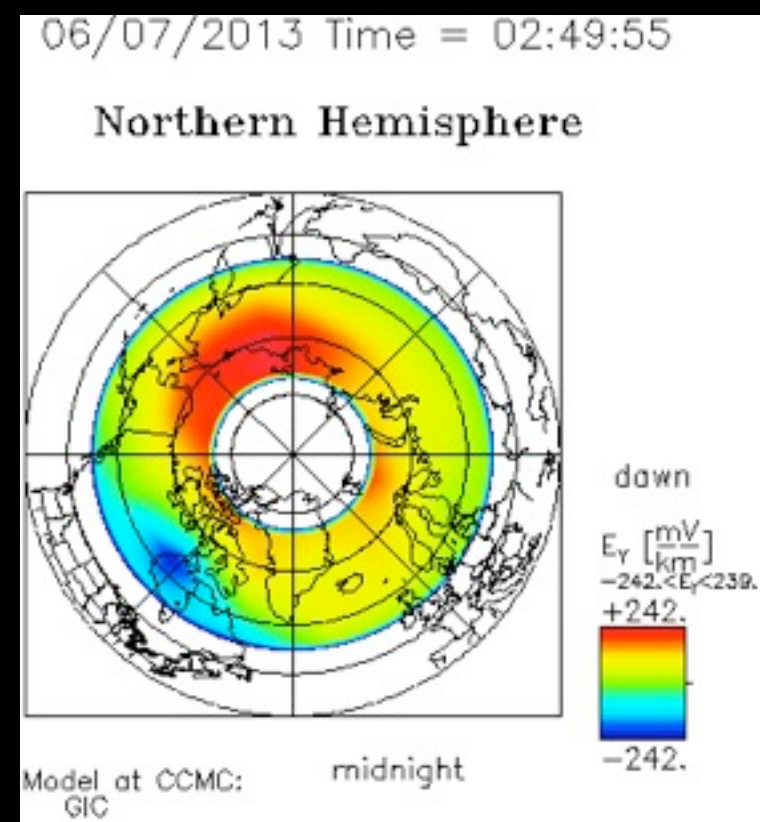
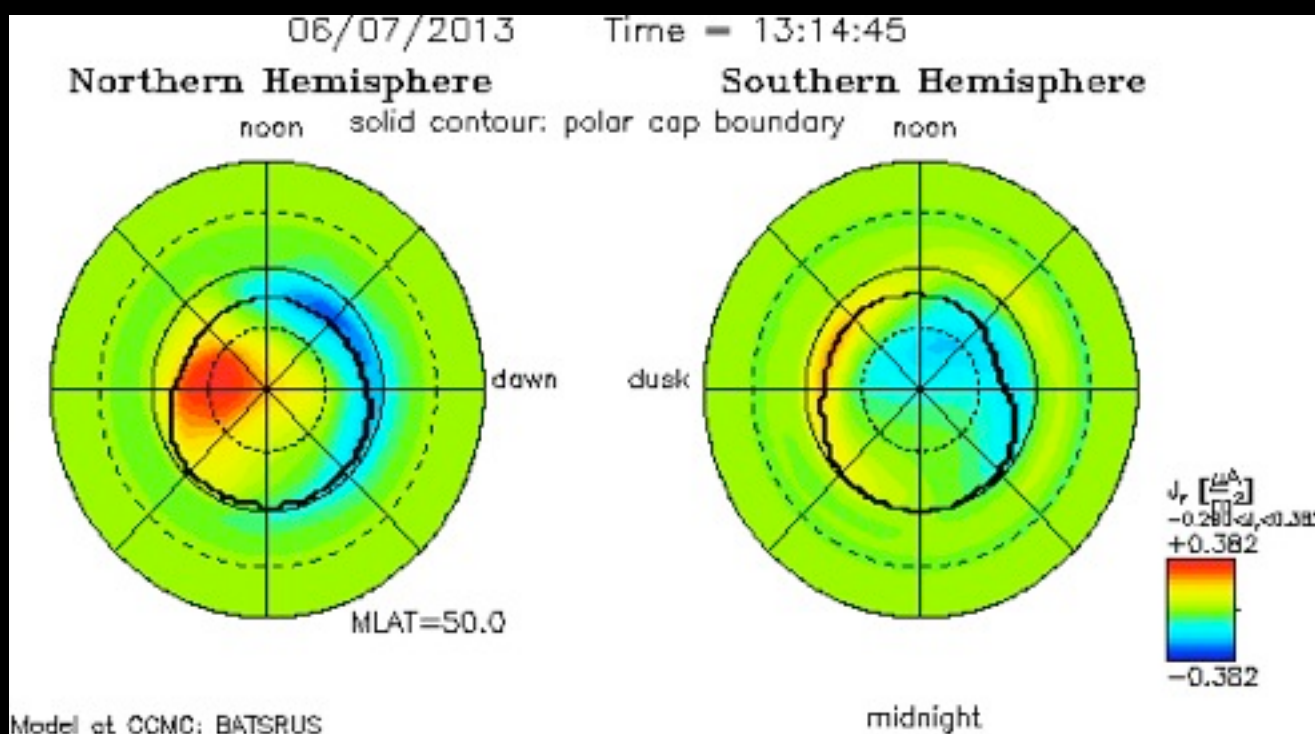
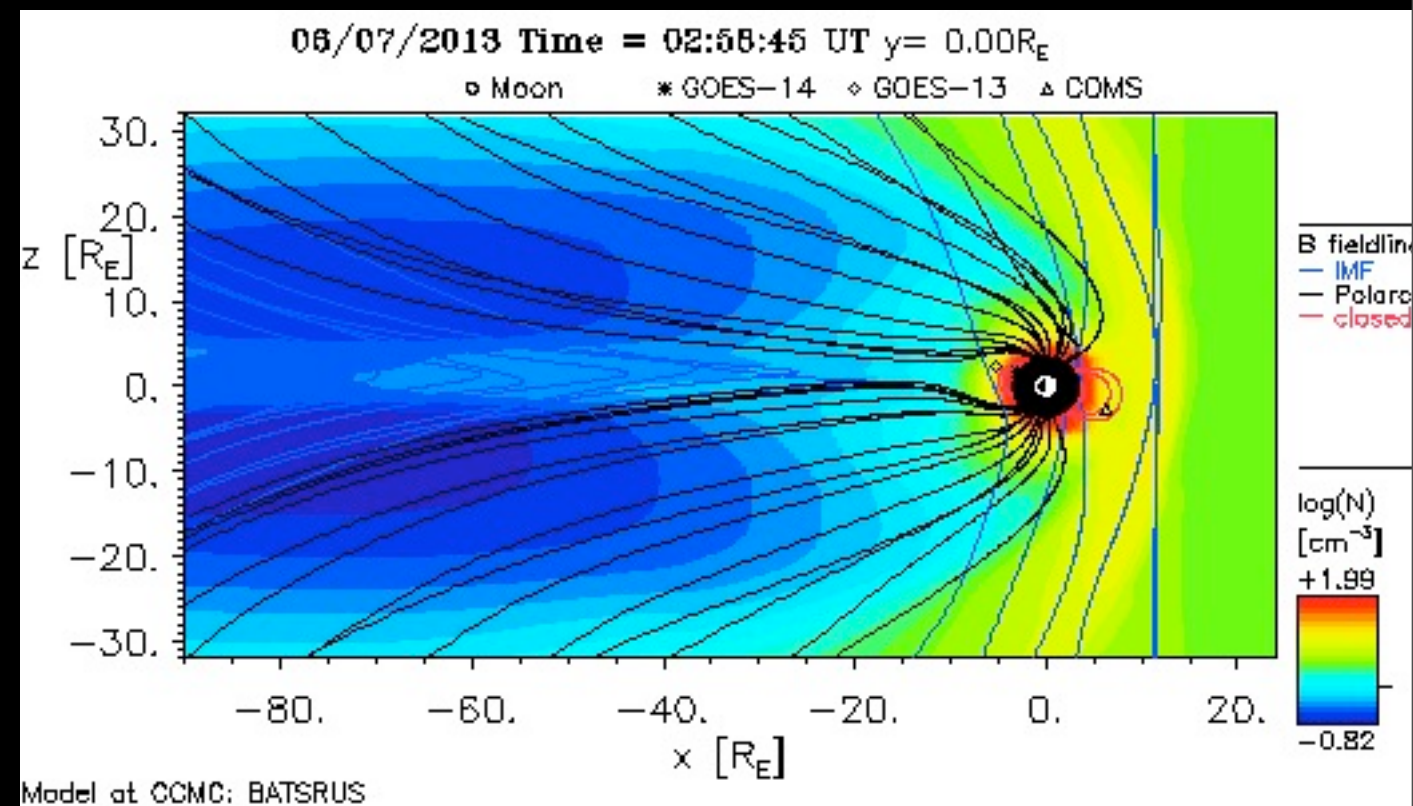
primary and popular

SWMF

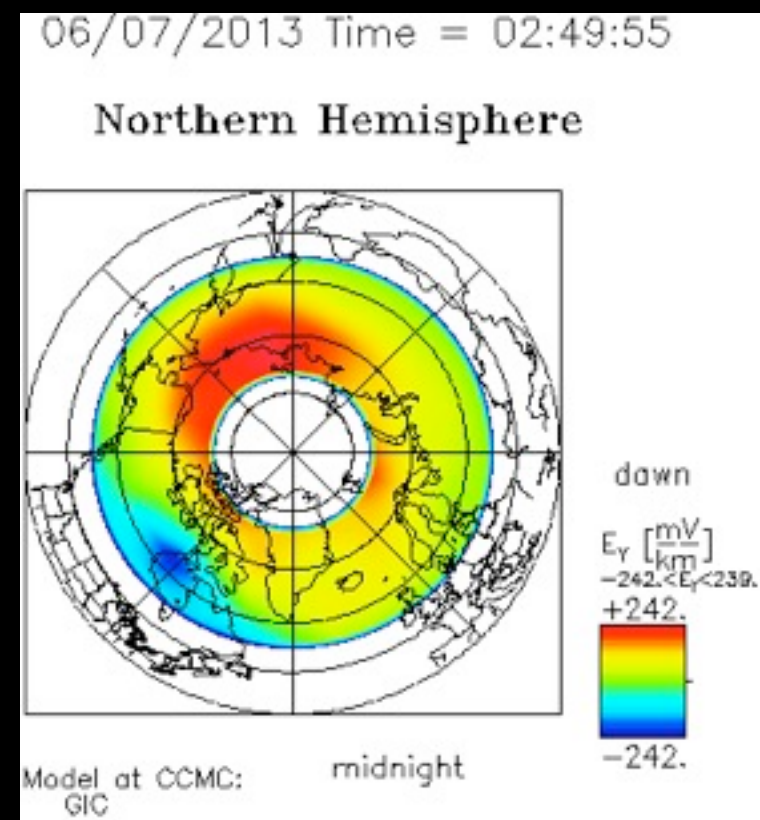
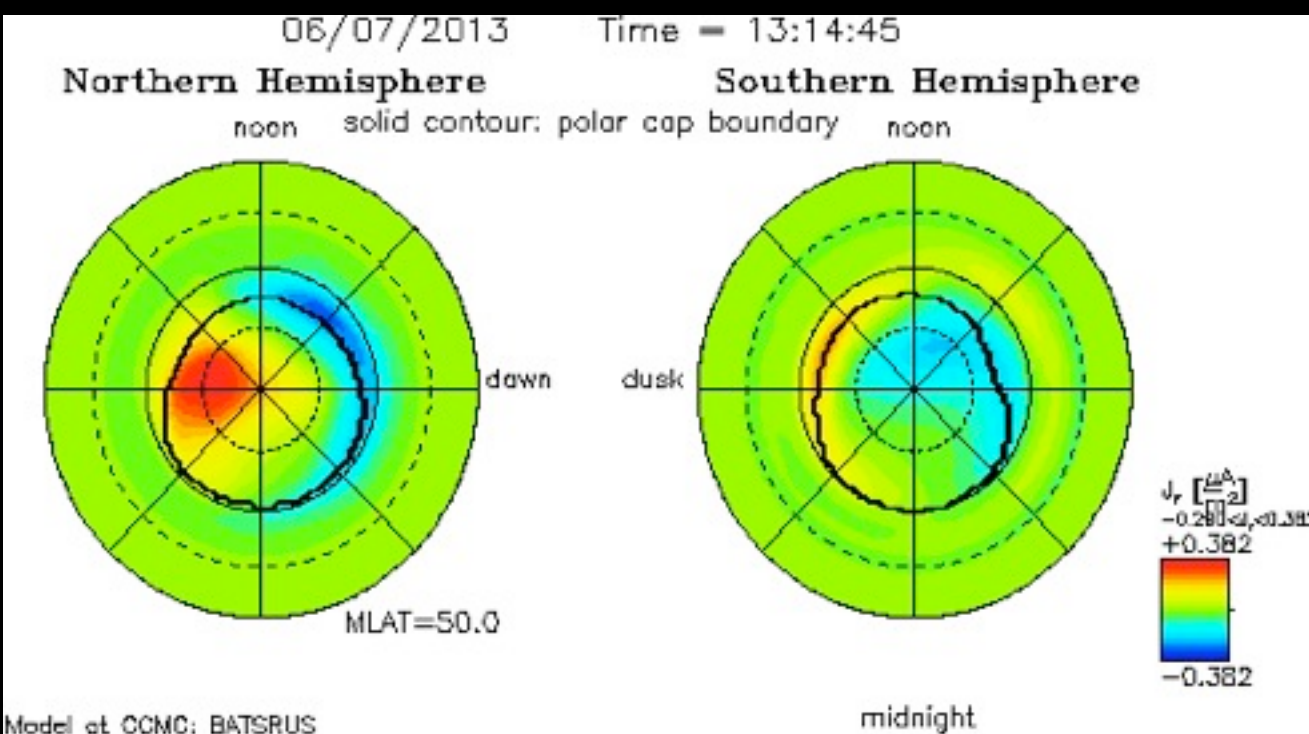
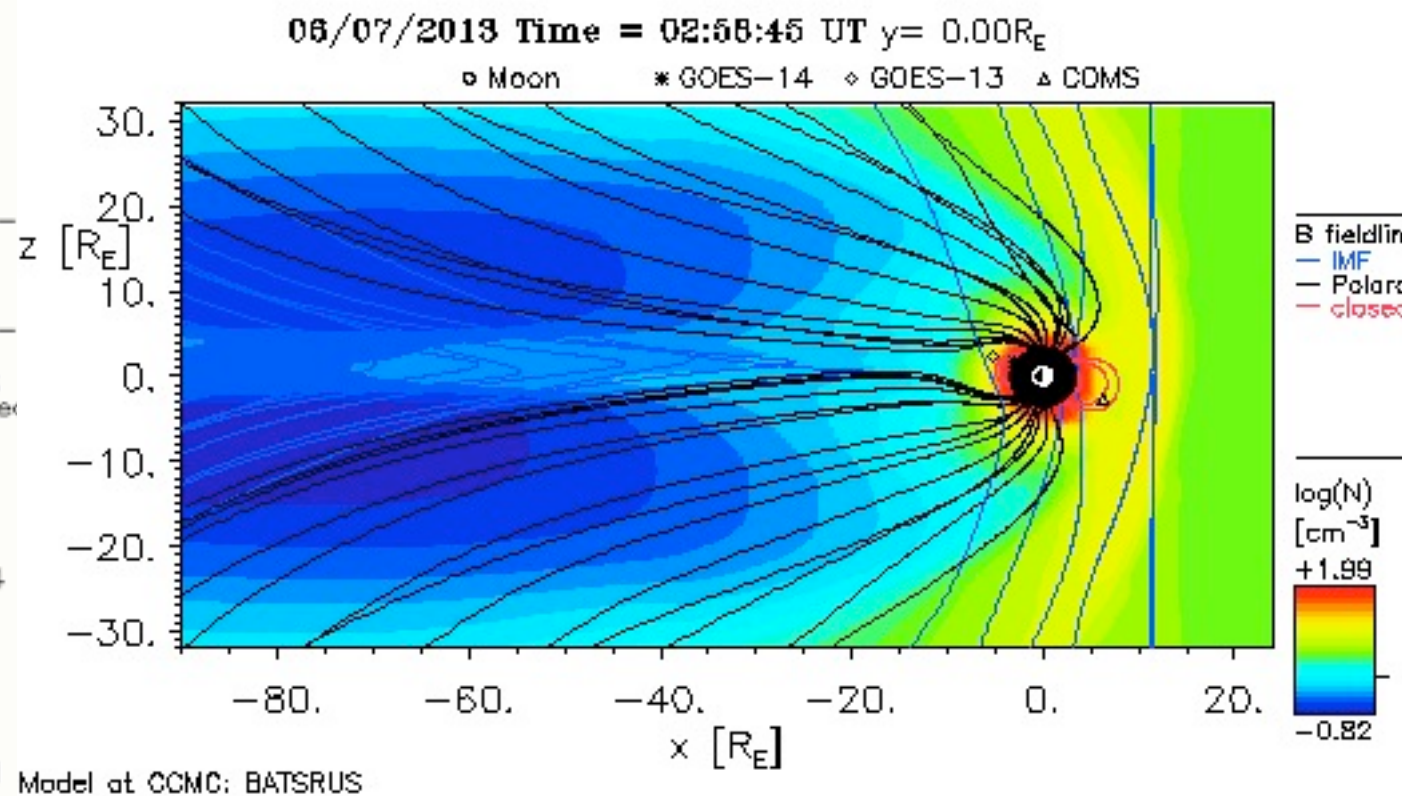
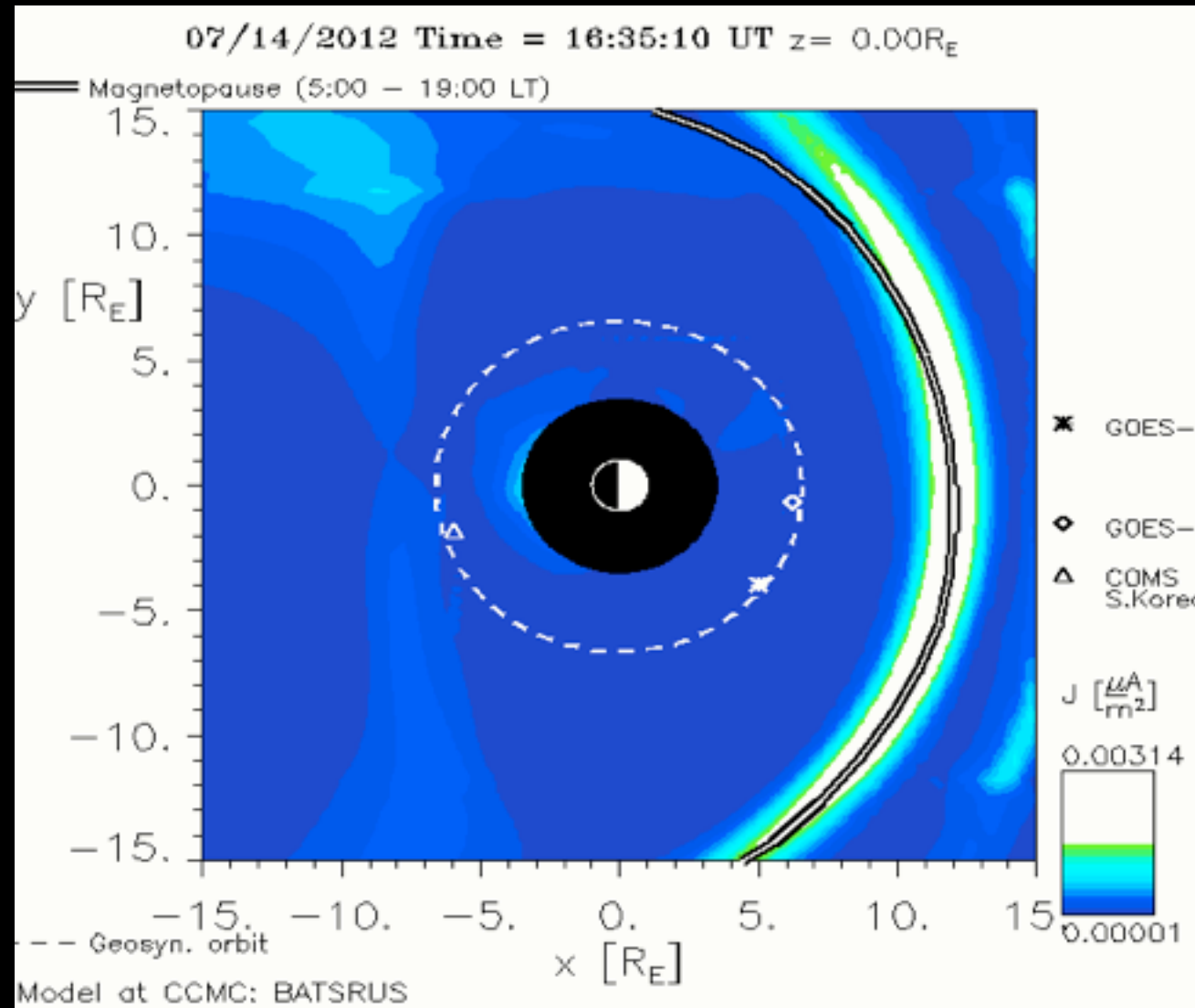


- the module - Global MHD model of Earth's magnetosphere - is heavily used

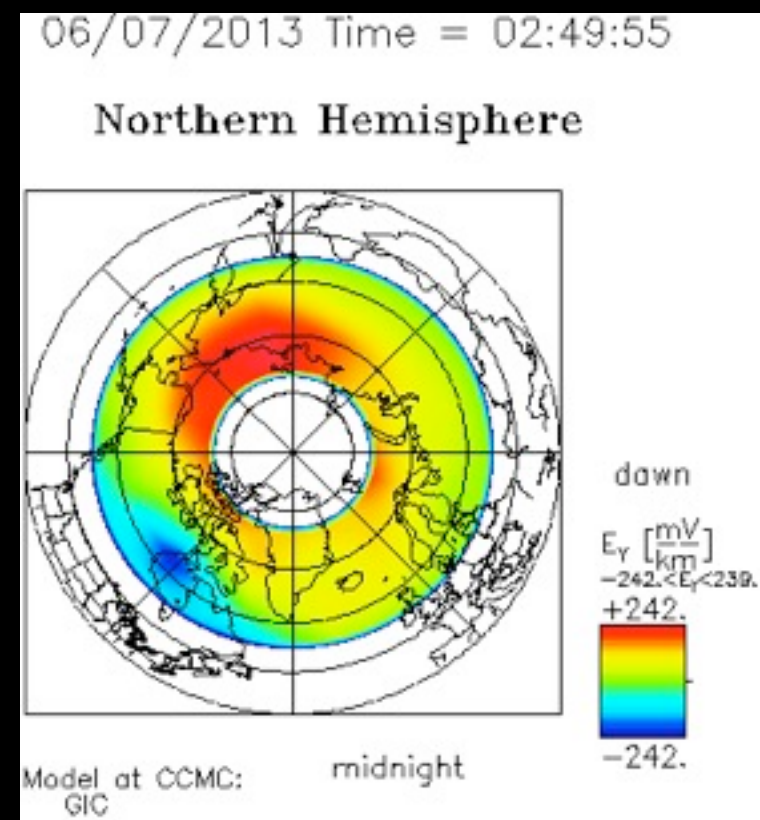
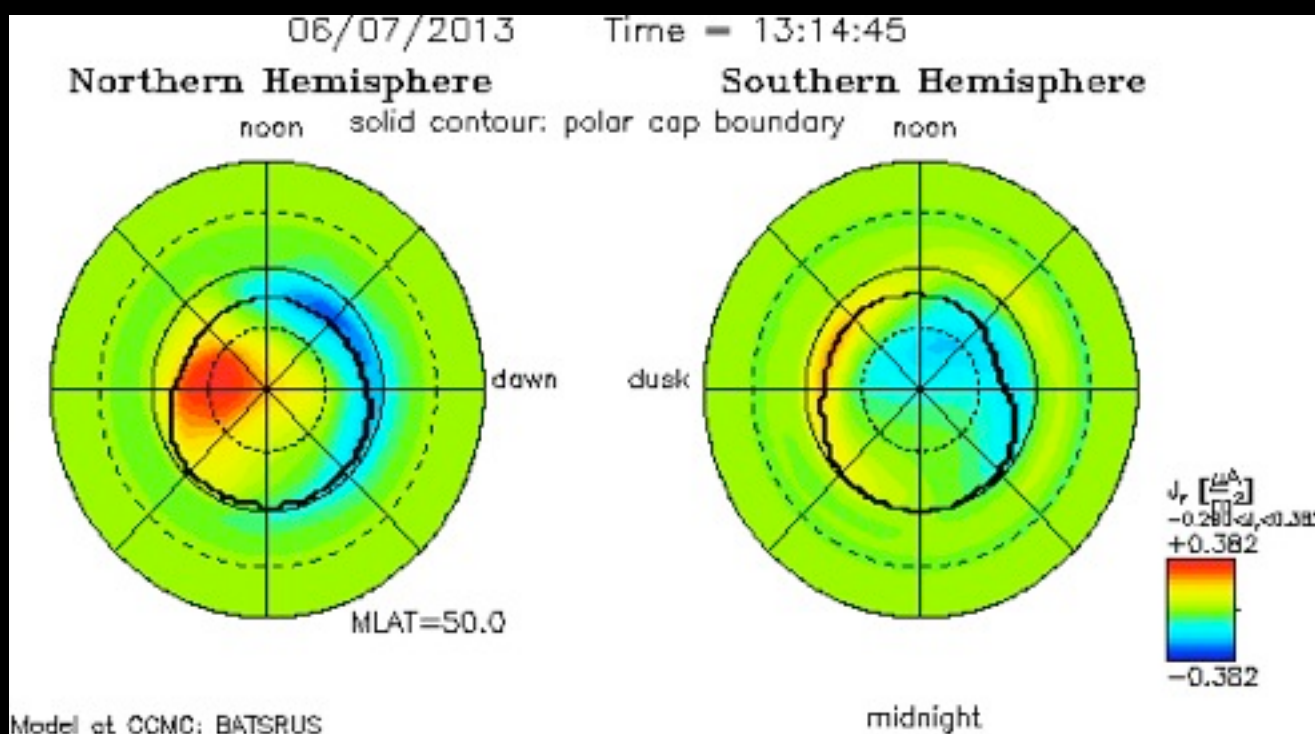
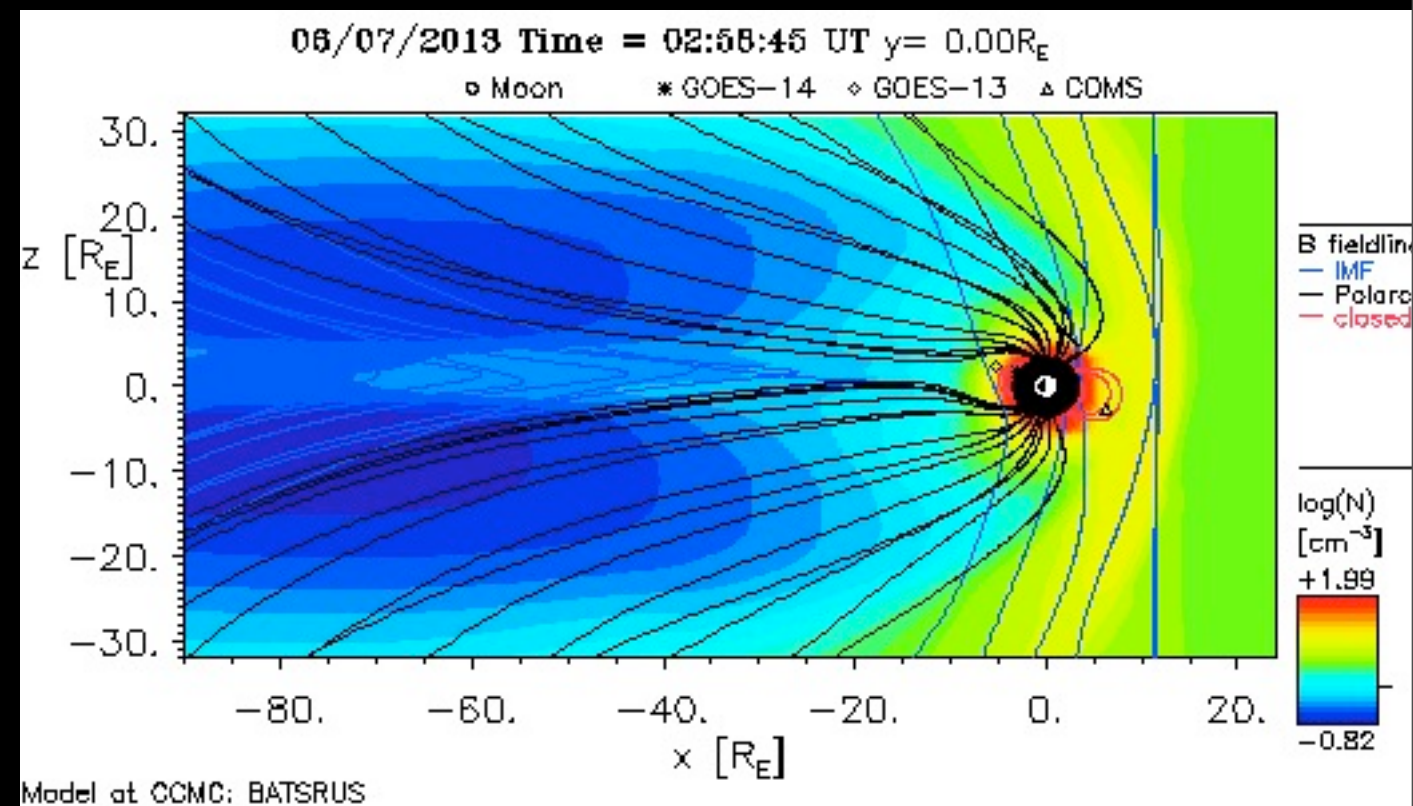
SWMF



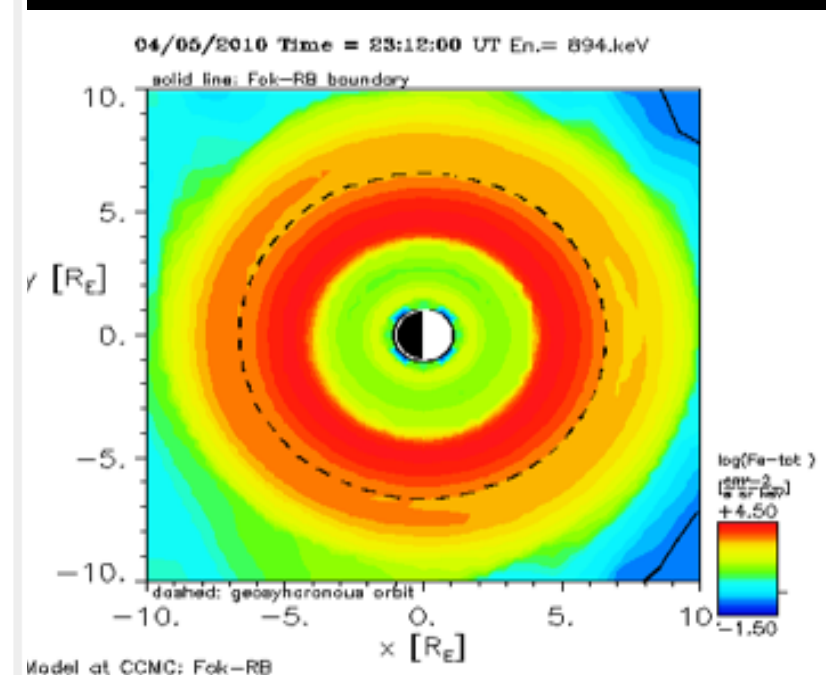
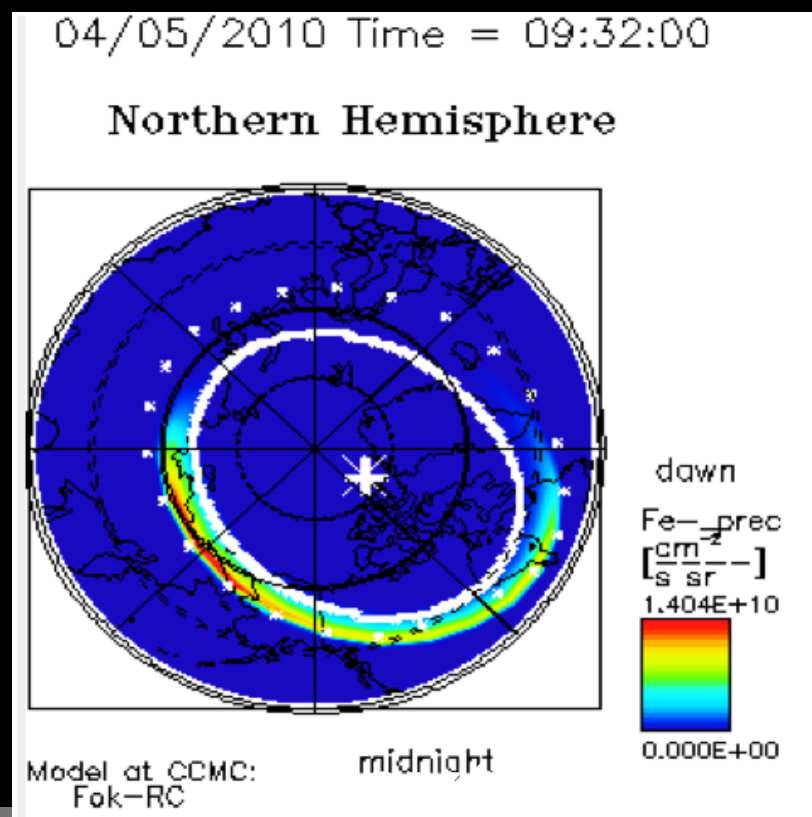
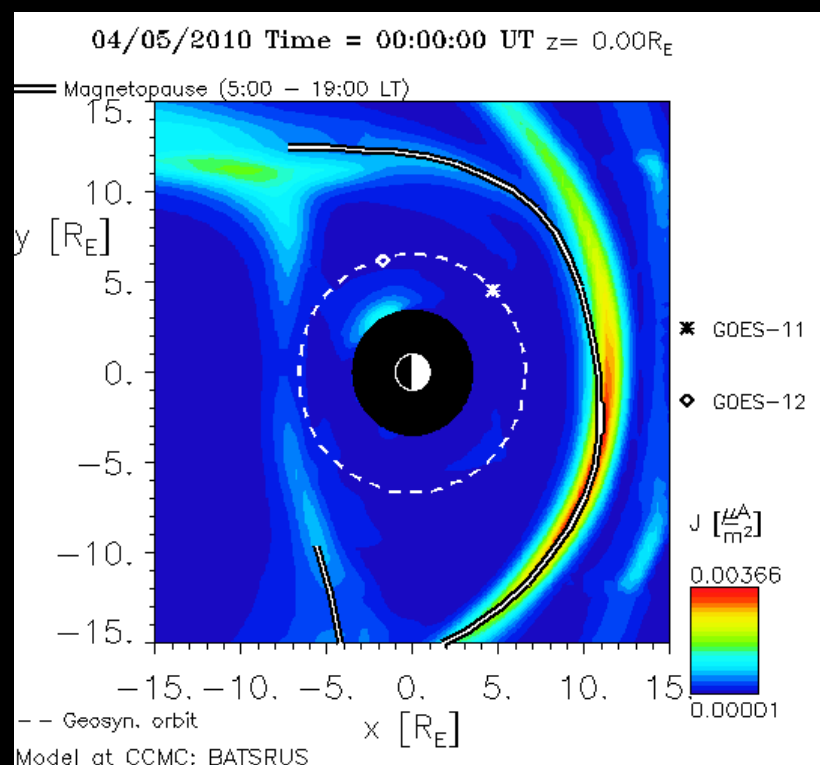
SWMF



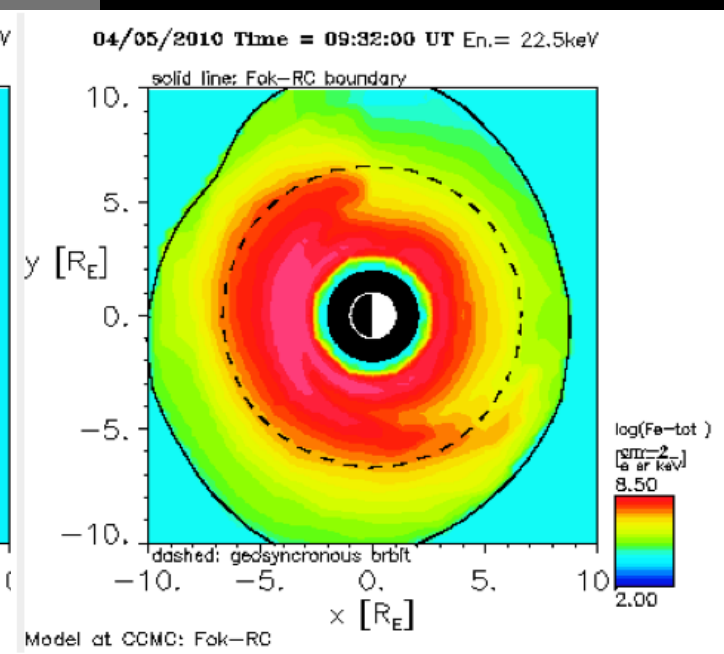
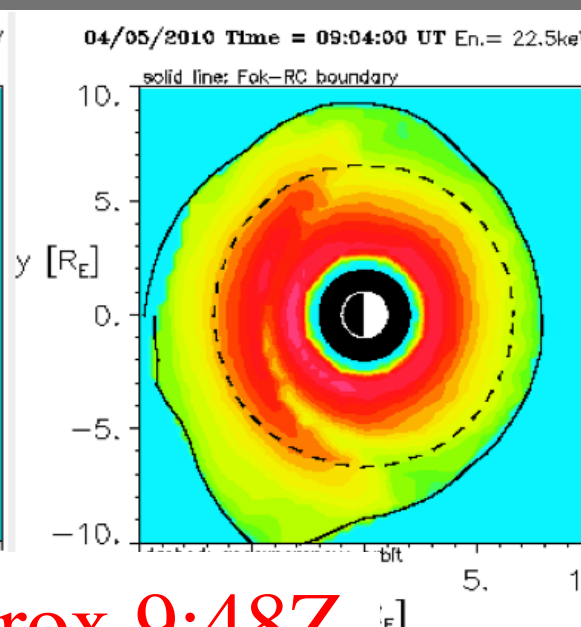
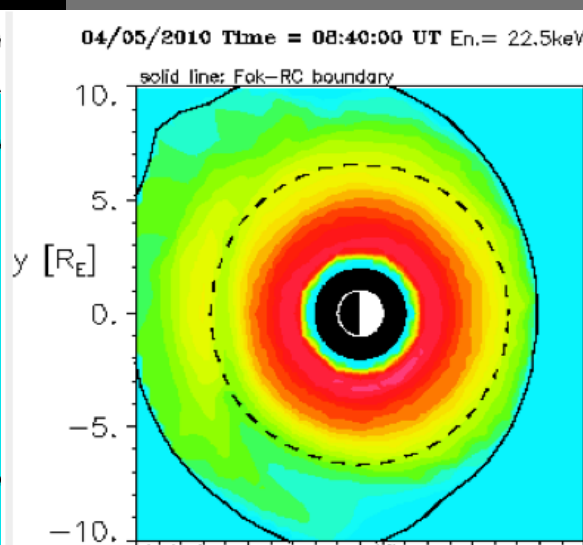
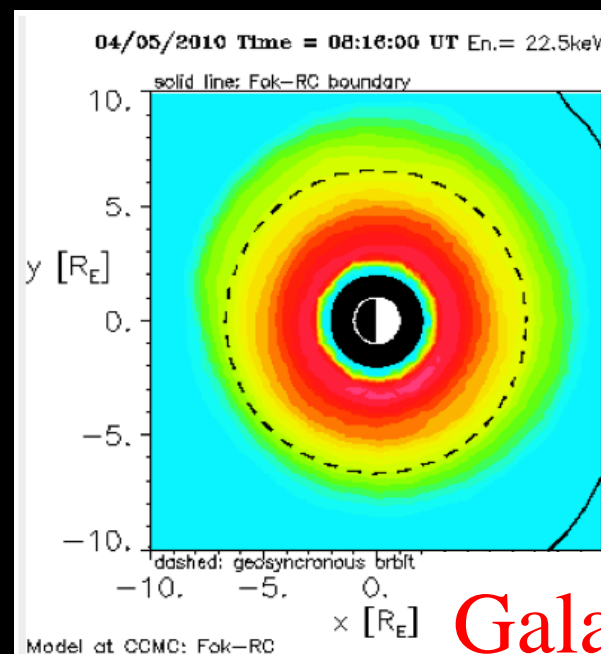
SWMF



Fok Ring Current Model

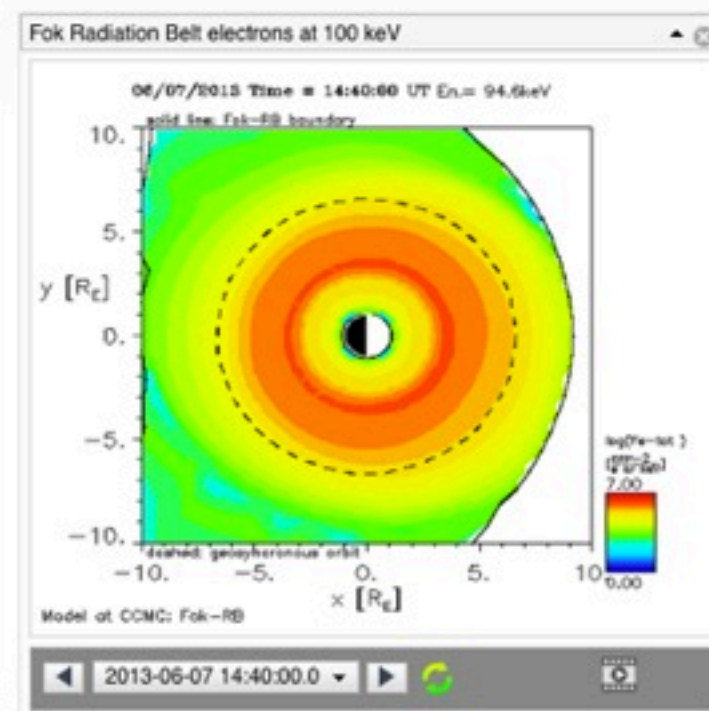
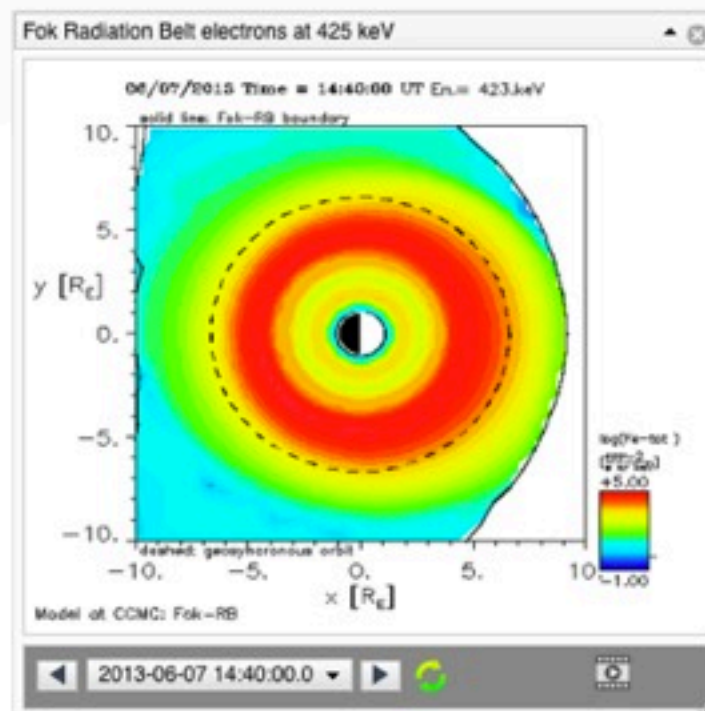
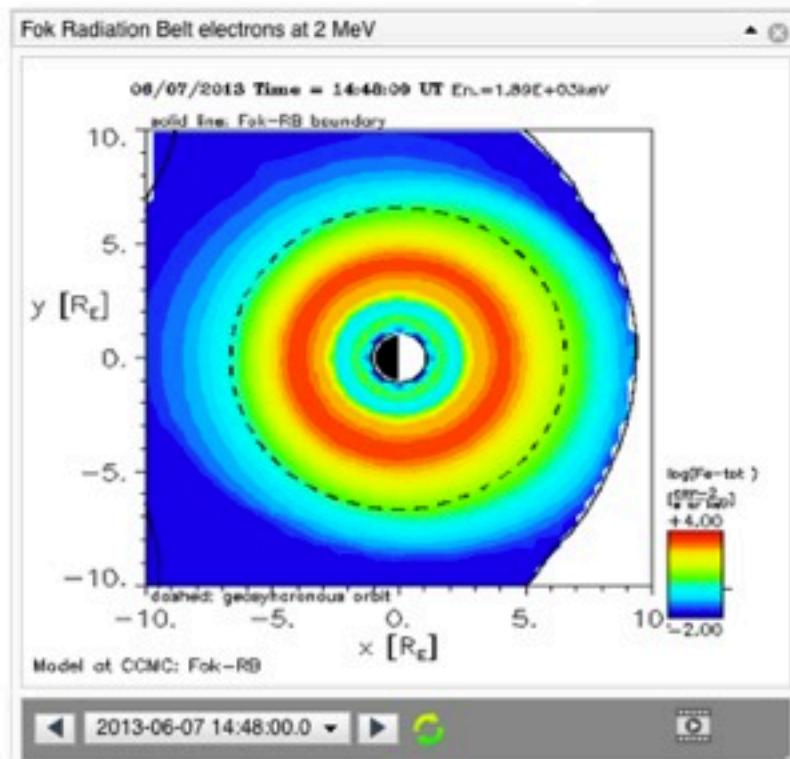
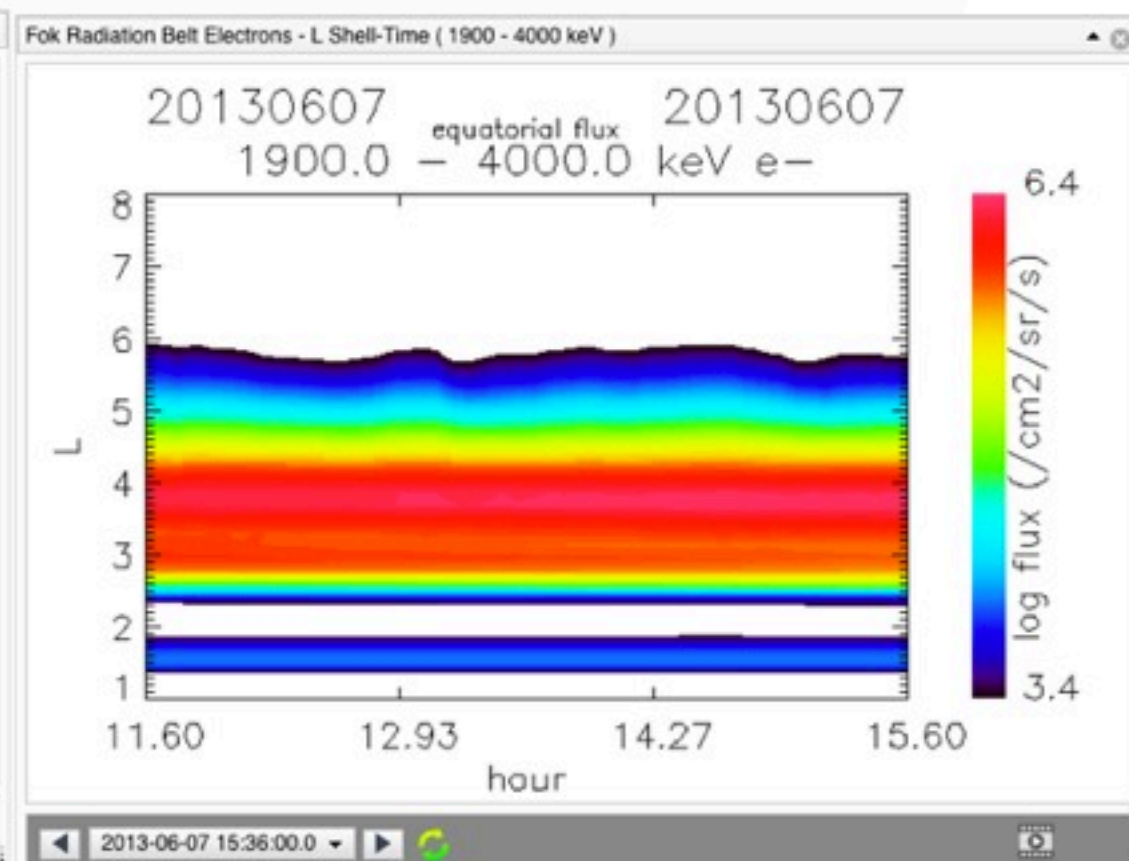
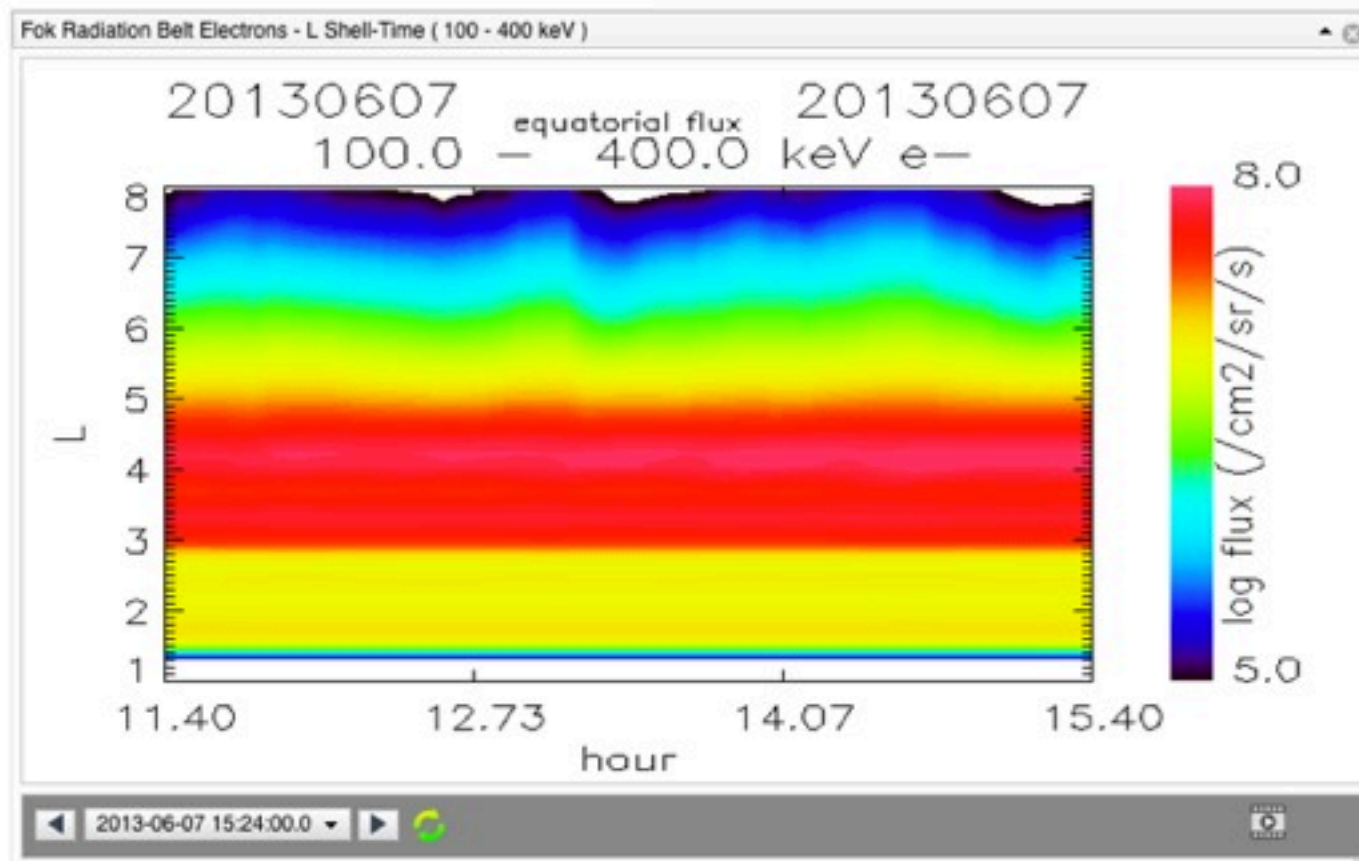


22keV electrons 4/5, 8:16-9:32Z

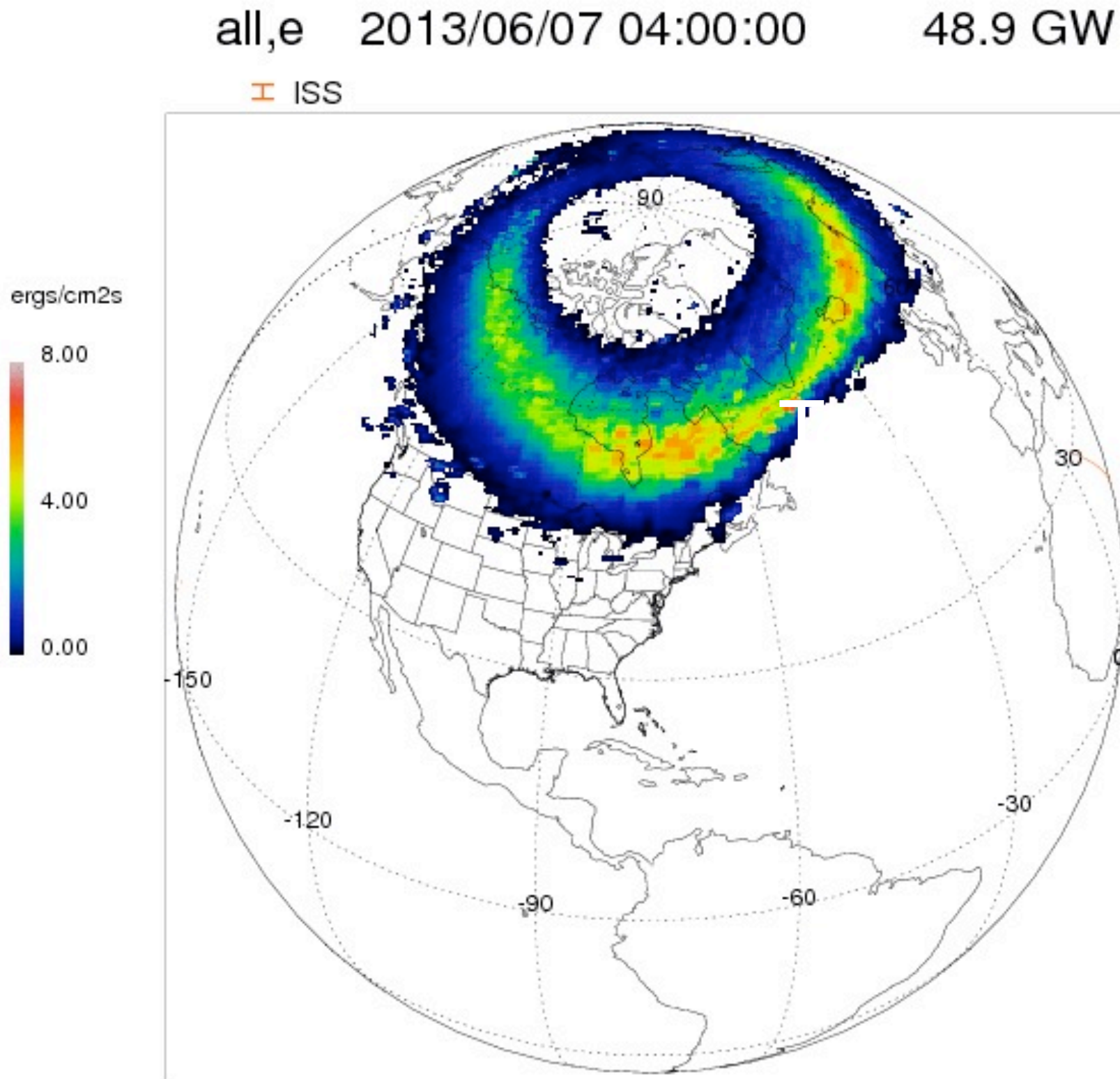


Galaxy 15 failed approx 9:48Z

Fok Radiation Belt Model



Auroral Model Ovation Prime

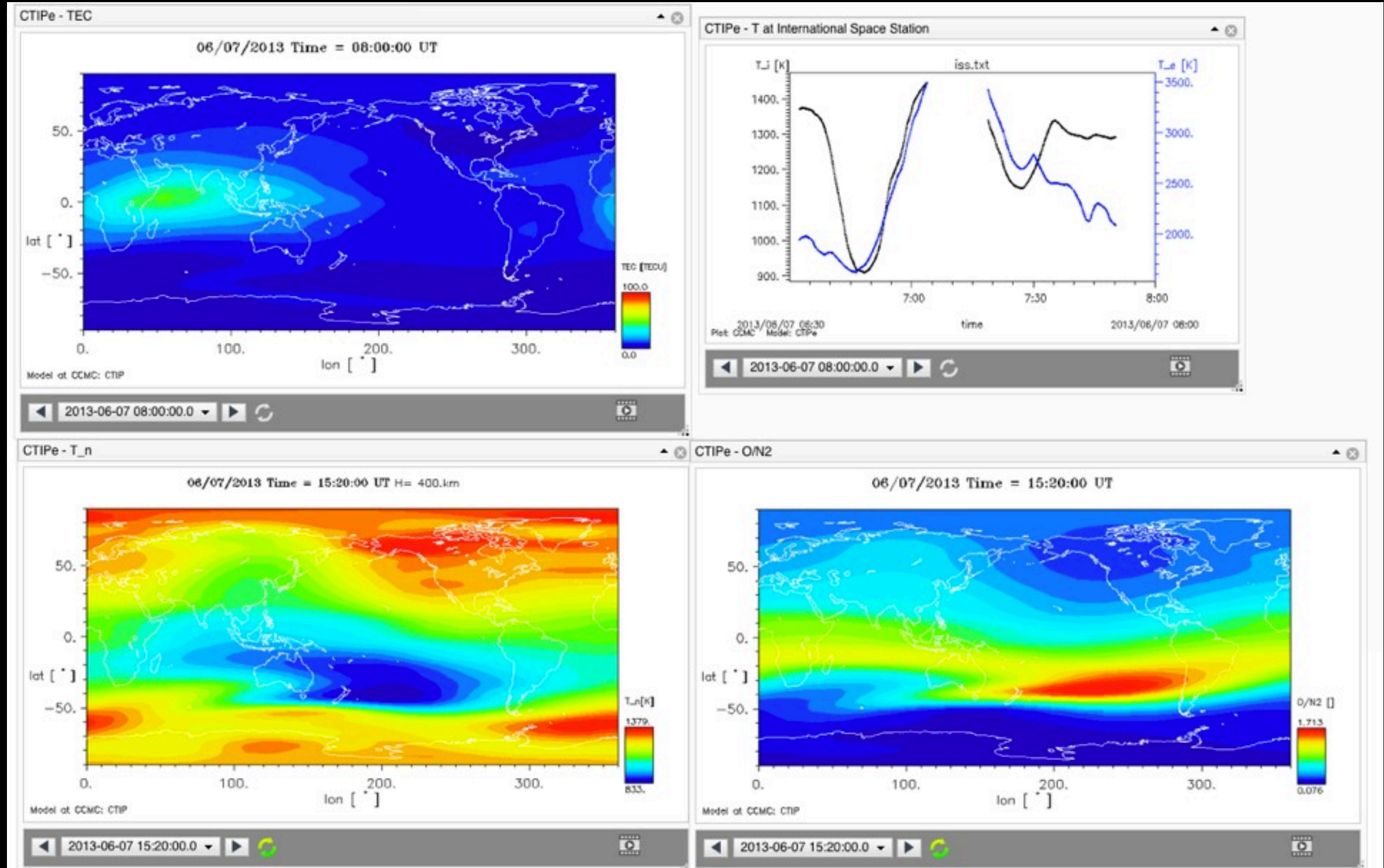


empirical model
based on ACE
measurements at
LI

Newell et al., 2007, JGR

CTIPe

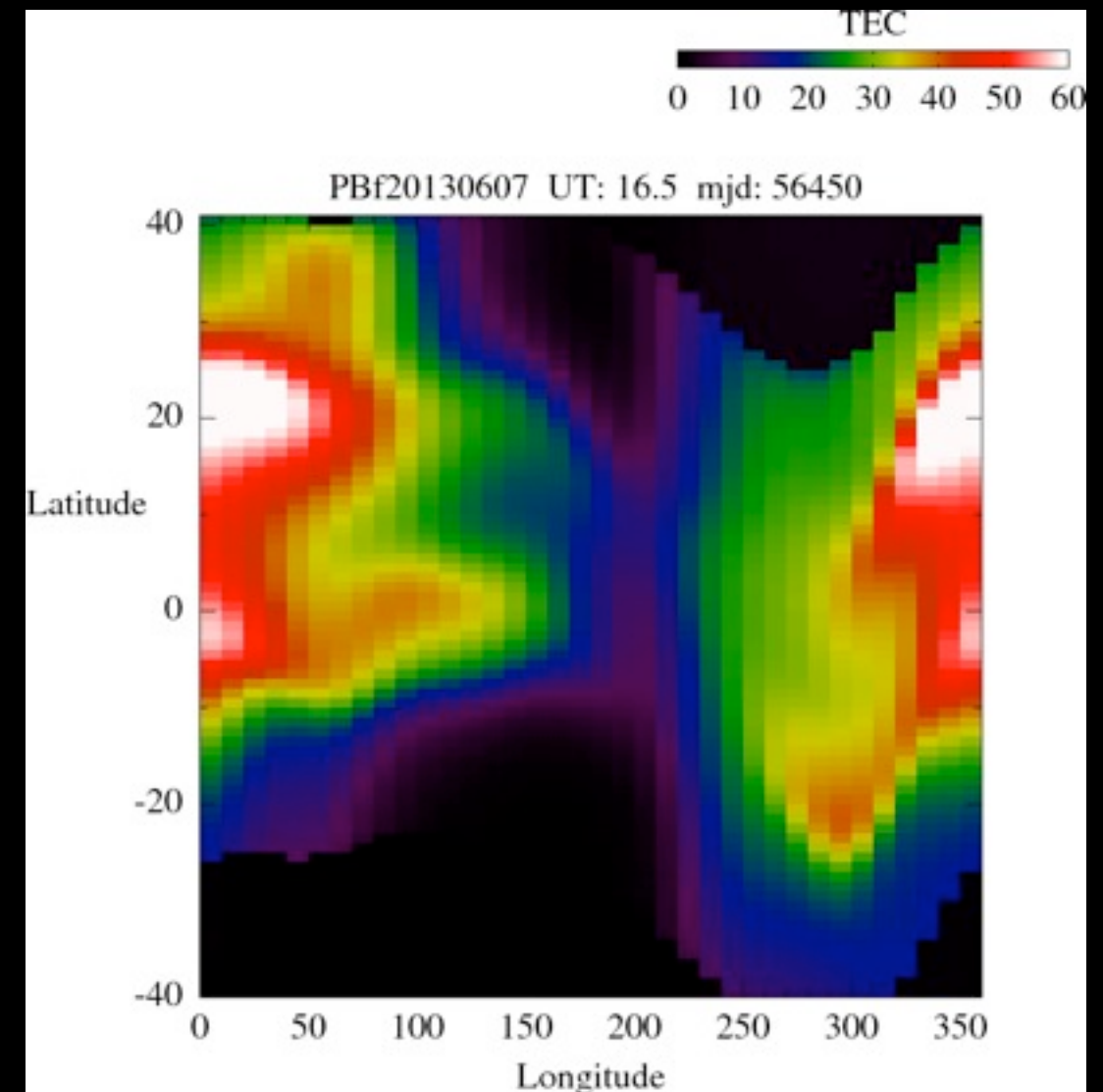
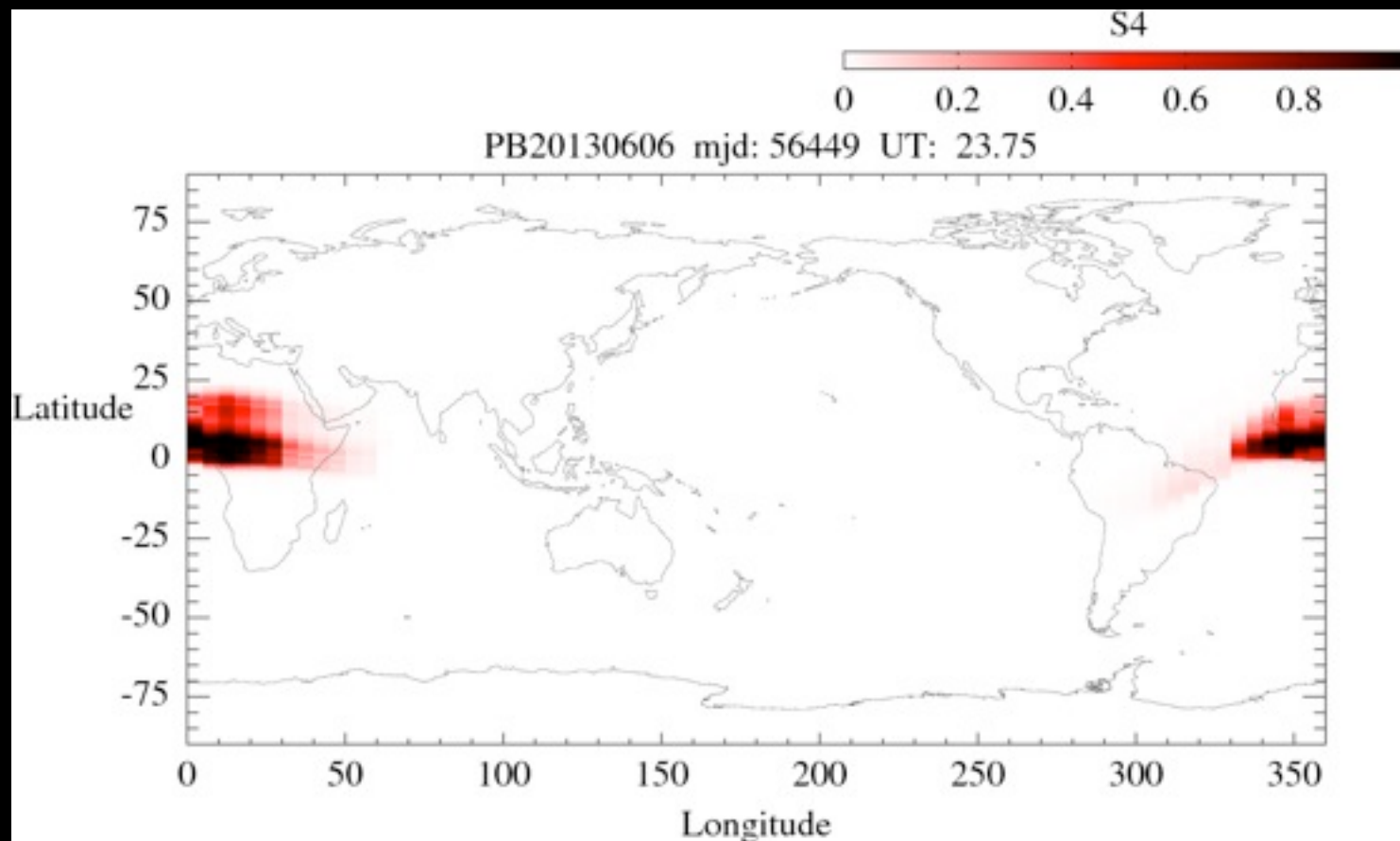
Coupled Thermosphere Ionosphere Plasmasphere Electrodynamics



PBMOD

scintillation model

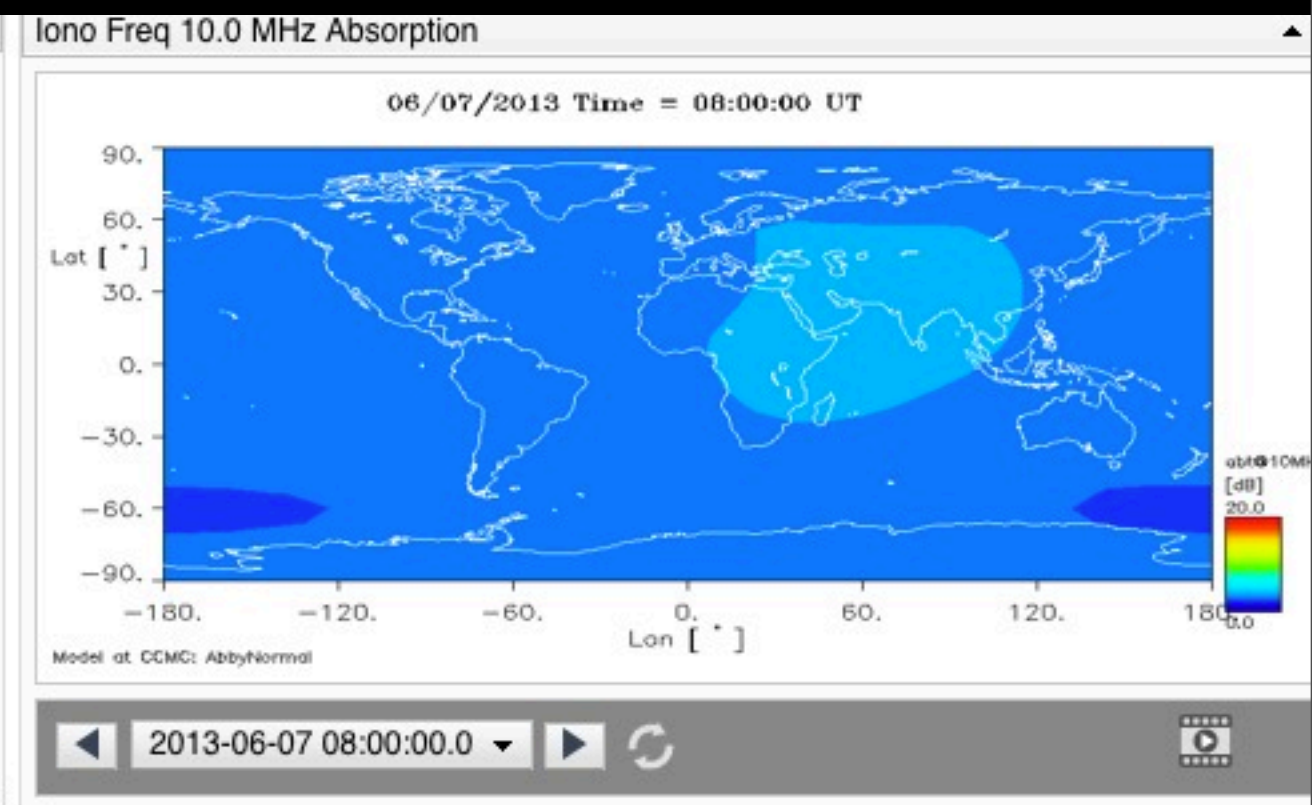
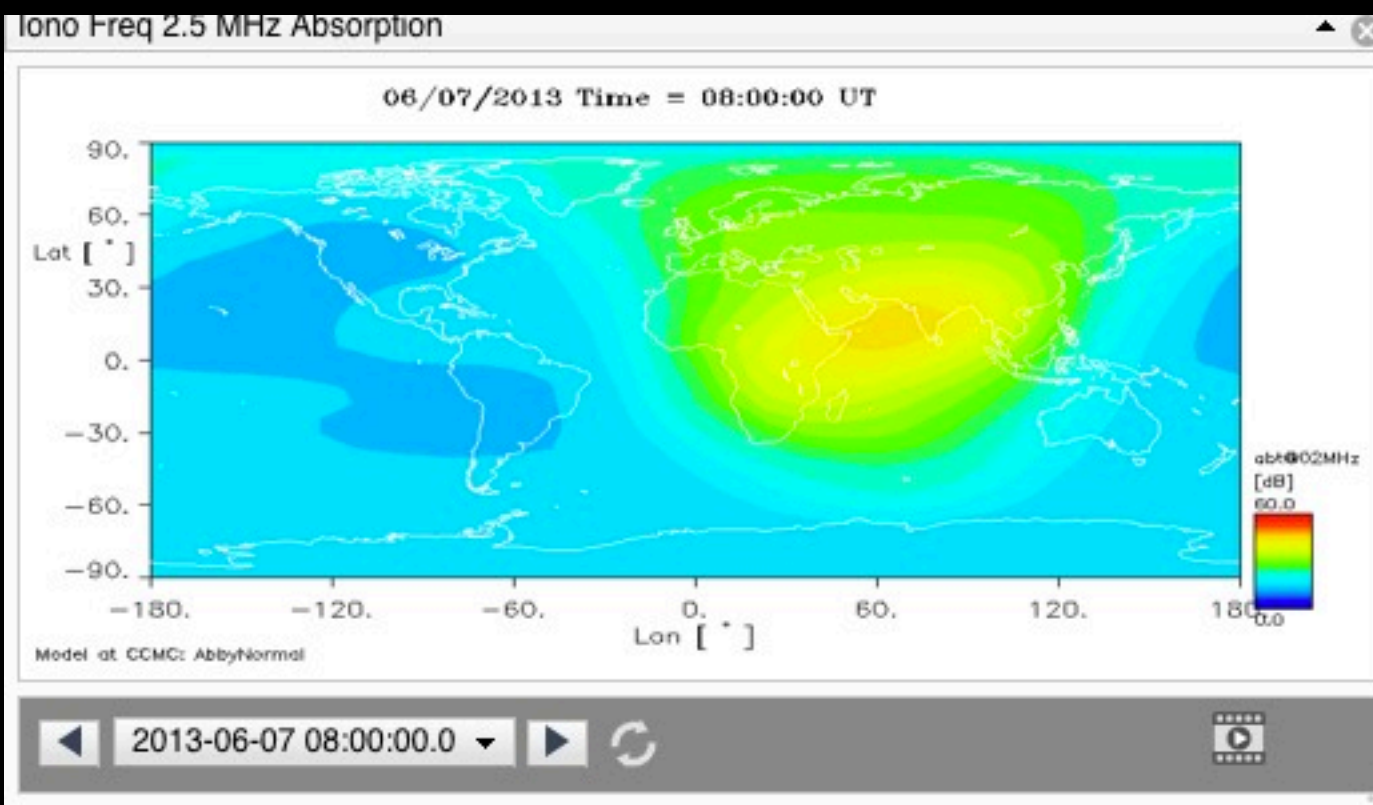
- http://ccmc.gsfc.nasa.gov/RoR_WWW/pbmod-rt/PBMOD-Text.html



ABBYNormal

HF signal absorption

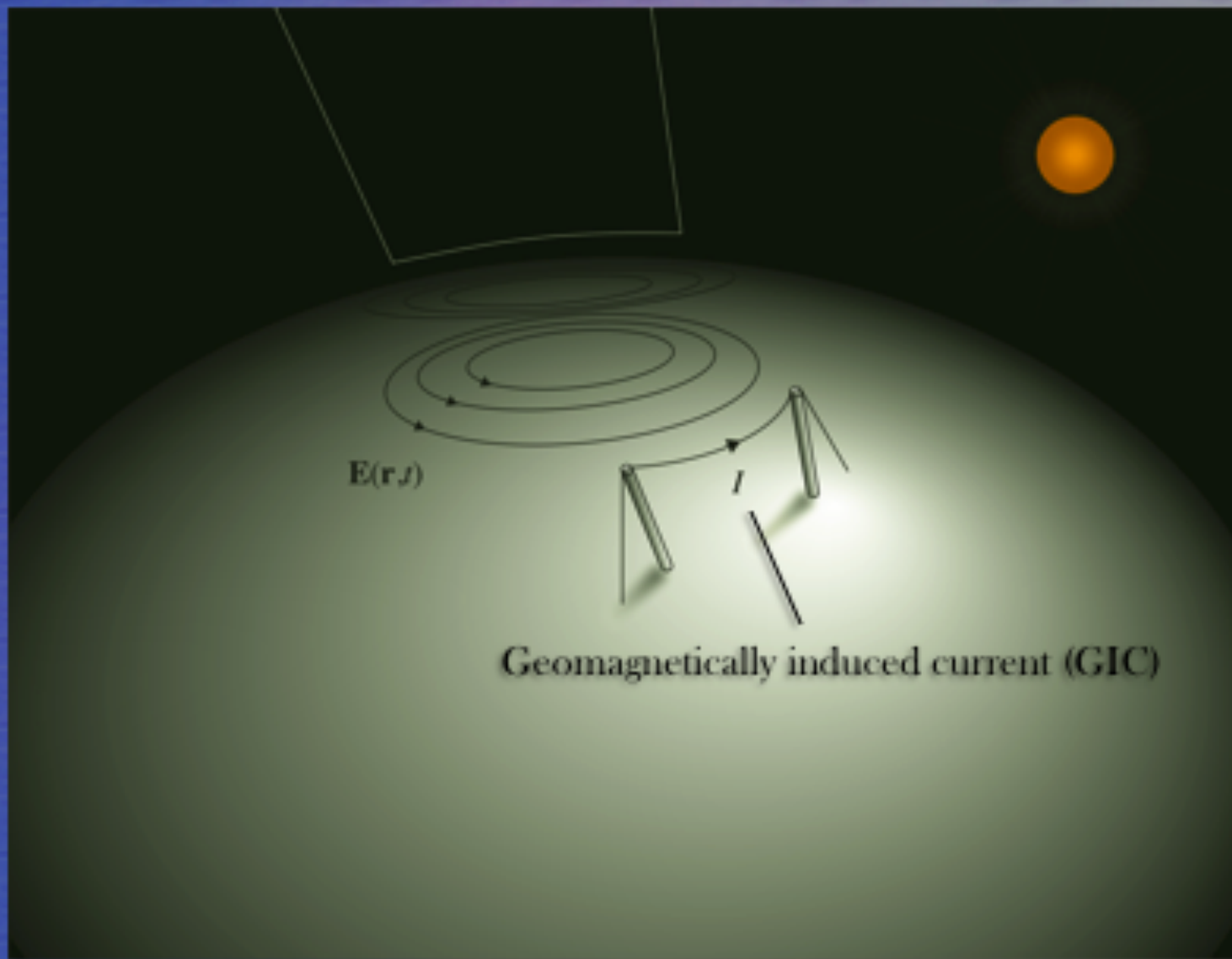
- <http://ccmc.gsfc.nasa.gov/models/modelinfo.php?model=ABBYNormal>



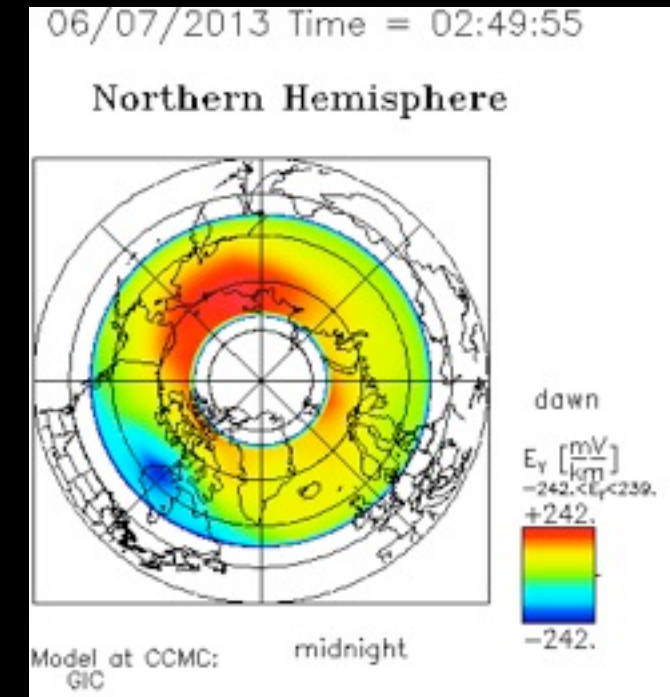
predicted K_p, D_{st}

- K_p based on Newell et al. formula
- D_{st} from SWMF
- D_{st} from WINDMI
- <http://ccmc.gsfc.nasa.gov/models/modelinfo.php?model=WINDMI>

GIC illustration



courtesy: Antti Pulkkinen



GIC

requires knowledge from the sun to
mud

